

D1

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Publication date: 1994-03-01  
Inventor(s): TANAKA YASUSHI  
Applicant(s): SONY CORP  
Application number: JP19920211898 19920810  
Priority number(s): JP19920211898 19920810  
INPADOC patent family: NONE

## Abstract:

**PURPOSE:** To decrease variations of line widths by applying specific SOG on a semiconductor substrate and applying a photoresist thereon, then exposing and developing this photoresist to form resist patterns and executing dry etching.  
**CONSTITUTION:** An SOG compsn. is prep'd. by dissolving a silicon compd. in an org. solvent, etc., then mixing a glassy material forming agent, org. binder, etc., with the soln. to prepare an SOG base, then compounding  $\geq 1$  kinds of dyestuff among benzoanthracene, 9-methyl anthracene and curimine, etc., absorbing exposing light of 240 to 450nm wavelength with this base. An insulating film 12 is then formed on an Si substrate 11 and wirings 13 are patterned thereon. After an SiO<sub>2</sub> film 14 is deposited over the entire surface, the SOG compsn. is applied thereon and is heat treated to form a cured SOG film 15. Further, an SiO<sub>2</sub> film 16 is deposited thereon and a resist is applied thereon. The formed resist film 17 is exposed to open contact holes. The resist patterns 17A are developed and with these patterns as a mask, the dry etching is executed, by which the semiconductor device is obt'd.

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<Abridged English translation of D1>

## [Claims]

1. A SOG composition comprising a pigment which absorbs light whose wavelength is 240 to 450 nm.
2. The SOG composition of claim 1, wherein the pigment is selected from one or more of the group consisting of curcumin, coumarin, benzo(a)anthracene, benzo(c)phenanthrene, 9-methylantracene, 9-methylphenanthrene,

1-nitronaphthalene, 2-nitronaphthalene, 3-nitronaphthalene, 9-nitrophenanthrene, o-nitrophenol, and phenazine.

3. A process of manufacturing a semiconductor device, comprising the steps of:  
applying a SOG containing a pigment which absorbs exposed light whose exposure wavelength is 240 to 450 nm on a semiconductor substrate which has a stepped section;  
applying a photoresist on the SOG, and exposing and developing the substrate to form resist pattern; and  
dry-etching the substrate using the resist pattern as a mask.

D2

Publication number: JP10161315 (A)

Publication date: 1998-08-19

Inventor(s): FUJITYAMA TAKESHI; FURUKAWA NOBUYUKI

Applicant(s): NIPPON STEEL CHEMICAL CO; NIPPON STEEL CORP

Application number: JP19960325508 19961205

Priority number(s): JP19960325508 19961205

INPADOC patent family: NONE

## Abstract:

PROBLEM TO BE SOLVED: To obtain an alkali-soluble photosensitive resin compsn. having high resolution and capable of maintaining its original characteristics such as heat resistance and electric insulating property by incorporating specified (meth) acryloxy group-contg. functional ladder type polyorganosilsesquioxane, a specified carboxyl group-contg. multifunctional (meth)acrylate compd., a (meth) acrylate compd. and a photopolymer. initiator. SOLUTION: This alkali-soluble photosensitive resin compsn. contains (meth) acryloxy group-contg. functional ladder type polyorganosilsesquioxane represented by formula I, a carboxyl group-contg. multifunctional (meth)acrylate compd. represented by formula III, a (meth)acrylate compd. and a photopolymer. initiator. In the formula I, R1 is 1-4C alkyl, etc., R2 is a group contg. at least one (meth)acryloxy bond represented by formula II and R3 is a group represented by R1 or R2. In the formula II, R4 is H, etc., and R5 is 1-18C (n+1)-valent hydrocarbon. In the formula III, R6 is H, etc., and R7 is a multivalent org. group contg. at least one carboxyl group.



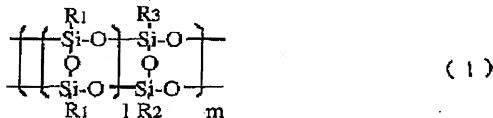
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<Abridged English translation of D2>

[Claims]

1. An alkali-soluble photoresist composition, comprising:

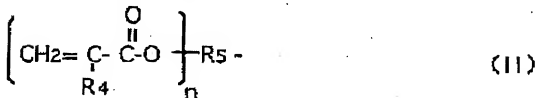
(A) (meth)acryloxy functional ladder polyorganosilsesquioxane of formula (I)



wherein

R<sub>1</sub> is independently selected from C<sub>1-4</sub> alkyl, aryl, and substituted or unsubstituted monovalence hydrocarbon group having a C<sub>6</sub> or more aliphatic ring,

R<sub>2</sub> is a group of formula (II)



having at least one (meth)acryloxy bond, where R<sub>4</sub> is hydrogen or methyl, R<sub>5</sub> is unsubstituted or substituted C<sub>1-18</sub> hydrocarbon group having (n+1)-valence, and n is an integer of 1 to 8,

R<sub>3</sub> is the same as R<sub>1</sub> or R<sub>2</sub>, and

l and m are degree of polymerization, and are an integer which is equal to or more than 1;

(B) an alkali-soluble multifunctional (meth)acrylate monomer, oligomer, or copolymer of formula (III) having carboxyl group

wherein

R<sub>6</sub> is hydrogen or methyl,

R<sub>7</sub> is multivalence organic group having one or more carboxyl group, and k is an integer of 1 to 4;

(C) (meth)acrylate ester or multifunctional (meth)acrylate monomer or oligomer; and

(D) a photopolymerization initiator.

(Omitted)

[Specification]

[0035]

The present photosensitive resin composition may be mixed with various substances and compounds to improve its properties in accordance with its application. An available additive may include, but not limited to, a thermal polymerization inhibitor such as hydroquinone and p-methoxyphenol; a color pigment such as phthalocyanine copper, phthalocyanine green, dimethylquinacridone, and titanium white; a thickener such as silica, calcium carbonate, kaolin, clay, and colloidal silica; UV absorbers; antioxidants. The present composition may also include commercially available diorganopolysiloxane.

[0038] To apply the present photoresist on a substrate such as silicon wafer, metal, ceramics, and plastics, various methods can be adopted. The method may include spin coating, flow coating, dip coating, spray coating, electropainting, roll coating, or brush painting method. *(Omitted)*

D3

Publication number: JP59109565 (A)  
Publication date: 1984-06-25  
Inventor(s): TAKEDA SHIROU; NAKAJIMA MINORU  
Applicant(s): FUJITSU LTD  
Application number: JP19820219174 19821216  
Priority number(s): JP19820219174 19821216  
INPADOC patent family: US4510283 (A)  
Abstract:

PURPOSE: To provide the titled resin soln. which has good shelf stability and can form a uniform coating film by spin coating, by dissolving a specified polycondensate of a hydrolyzed alkoxysilane and a polysilsesquioxane prepolymer in an org. solvent. CONSTITUTION: 30-60pts.wt. (on a solid basis) soln. (A) of a polycondensate of a hydrolyzed tetramethoxy (or ethoxy) silane having a weight-average MW of 1,000-6,000 and 70-40pts.wt. polysilsesquioxane prepolymer (B) which has a weight-average MW of 2,500-7,000 and in which org. groups directly attached to silicon atoms are phenyl, methyl, ethyl and vinyl groups (with the proviso that 5-50mol% thereof is the phenyl group), are dissolved in an org. solvent (C) having a b.p. of 110 deg.C or above under atmospheric or subatmospheric pressure (e.g. methyl cellosolve acetate or methyl ethyl ketone), followed by treating at 5mm.Hg or below to obtain a coating resin soln. contg. solid at a concn. of 20-50wt%, which is suitable for use as an insulating material for wires.

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D4

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Inventor(s): SITZMANN EUGENE VALENTINE; ANDERSON RUSSELL  
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Applicant(s): ALLIED SIGNAL INC [US]

Application number: JP19950503392T 19950626

Priority number(s): WO1995US08074 19950626; US19940266829 19940627;  
US19950463086 19950621

INPADOC patent family: WO9600412 (A1)

## Abstract:

Polymer precursor formulations suitable for stereolithography may be prepared from compositions containing vinyl ether functionalized compounds and epoxy functionalized compounds plus an effective amount of a cationic photoinitiator and an ultraviolet light-absorbing compound to provide a predetermined depth of cure. Preferably, the ultraviolet light-absorbing compound is anthracene or its derivatives. Anthracenes having pendant alkoxy groups are preferred for use with light wavelengths greater than 360 nm, particularly 9,10-dimethoxy-2-ethyl anthracene.

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D5

Publication number: JP9183853 (A)  
Publication date: 1997-07-15  
Inventor(s): ECKBERG RICHARD P [US]  
Applicant(s): GEN ELECTRIC [US]  
Application number: JP19960246766 19960919  
Priority number(s): US19950536867 19950929  
INPADOC patent family: US5583195 (A)

## Abstract:

Epoxy-silicone polymers partially or completely functionalized by a fluorescent, photo-sensitizing, or simultaneously fluorescing and photo-sensitizing substituent bonded to the silicone polymer by means of a carbon oxygen carbon bond provide fluorescent dye marking compounds for silicone compositions that are particularly useful in determining the quality of release coatings made therewith.

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D6

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Publication date: 1994-04-08

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Applicant(s): IBM

Application number: JP19930159869 19930630

Priority number(s): US19920932830 19920820

INPADOC patent family: US5385804 (A)

## Abstract:

A silicon-containing negative photoresist is used as the top imaging layer in a bilayer substrate patterning scheme. The photoresist is a single component resist in which the photoactive element is chemically bonded to the base polymer. In particular, an aromatic azide containing group is covalently bonded to the phenolic group of the poly(4-hydroxybenzyl)silsesquioxane (PHBS) via an esterification reaction. The new photoresist is easily synthesized and has the advantageous properties of aqueous base developability, excellent O<sub>2</sub> RIE resistance, and high sensitivity to DUV, I-line and E-beam exposures.

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